

Claims:

1. An apparatus for performing an initial symbol  
synchronization and detection operation in an OFDM  
5 (Orthogonal Frequency Division Multiplexing) receiver, the  
OFDM receiver including a correlator for making a correlation  
between a currently received signal and a previously received  
signal and outputting a result of the correlation, a sliding  
integrator for accumulating output signals of the correlator  
10 during a set guard interval and outputting a result of the  
accumulation, and a symbol integrator for accumulating output  
signals of the sliding integrator and outputting a result of  
the accumulation, said apparatus comprising:

a maximum-value detector for outputting a maximum-value  
15 detection signal when detecting a maximum value of  
accumulated correlation values from one of the integrators,  
and for selectively outputting a maximum value of accumulated  
correlation values from the other integrator;

a maximum-value position detector for outputting a  
20 count value currently counted by an internal counter as  
information associated with maximum-value position detection  
in response to the maximum-value detection signal; and

a guard-interval-mode discrimination unit for  
periodically comparing the count value outputted from the  
25 maximum-value position detector and a previous count value,

producing a difference value between maximum-value positions,  
accumulating difference values during a predetermined time,  
producing an average value of the difference values,  
comparing the average value with a predetermined guard-  
5 interval discrimination parameter, and discriminating a guard  
interval mode and an FFT (Fast Fourier Transform) mode  
according to a result of the comparison.

2. The apparatus as set forth in claim 1, further  
10 comprising:

a counting period/length controller for adjusting a  
counting period of the maximum-value position detector and  
data lengths associated with the correlator and the  
integrators in response to the discriminated FFT mode and  
15 guard interval mode; and

a useful-symbol start-point detector for adding a value  
of discriminated guard interval length to the count value  
outputted from the maximum-value position detector so that a  
start point of a useful symbol is detected.

20 3. The apparatus as set forth in claim 1 or 2, wherein  
data lengths associated with the correlator and the sliding  
integrator are set so that the correlator and the sliding  
integrator correspond to length of 2048 samples and length of  
25 64 samples in an initial guard-interval discrimination mode,

respectively, and wherein a counting period of the internal counter of the maximum-value position detector is set so that the internal counter of the maximum-value position detector periodically carries out a counting operation every 2048 samples.

4. The apparatus as set forth in claim 1 or 2, wherein the maximum-value detector allows a maximum-value position to be detected on the basis of a pre-arriving path in a form of accumulated correlation values for an SFN (Single Frequency Network).

5. An apparatus for performing an initial symbol synchronization and detection operation in an OFDM (Orthogonal Frequency Division Multiplexing) receiver, the OFDM receiver including a correlator for making a correlation between a currently received signal and a previously received signal of a previous symbol duration and outputting a result of the correlation, and sliding integrators, symbol integrators and maximum-value detectors outputting maximum values sequentially coupled to the correlator and associated with guard interval modes ( $1/32$ ,  $1/16$ ,  $1/8$  and  $1/4$ ) so that types of guard intervals for an OFDM signal are discriminated, said apparatus comprising:

maximum-value position detectors for outputting count

values currently counted by internal counters as information associated with maximum-value position detection in response to maximum-value detection signals from the maximum-value detectors arranged on guard interval paths; and

5           a guard-interval-mode discrimination unit for comparing a ratio of first and second largest values among the maximum values outputted from the maximum-value position detectors arranged on the guard interval paths with a threshold value, discriminating an FFT (Fast Fourier Transform) mode, and  
10           determining that a guard interval mode corresponding to a guard interval path that outputs the first largest value is valid.

6. The apparatus as set forth in claim 5, further  
15           comprising:

          a useful-symbol start-point detector for adding a value of discriminated guard interval length to a count value outputted from a maximum-value position detector so that a start point of a useful symbol is detected.

20           7. A method for performing an initial symbol synchronization and detection operation so that a guard interval and useful data duration are discriminated from a modulated signal based on OFDM (Orthogonal Frequency Division  
25           Multiplexing) and an FFT (Fast Fourier Transform) operation

is carried out, said method comprising the steps of:

detecting a position in which an output value of a sliding integrator is maximal from a path of an observation guard interval selected from a plurality of guard intervals;

5        comparing a value of the position in which the output value of the sliding integrator is maximal with a previous maximum-value position every counting period, producing a difference value between maximum-value positions, accumulating difference values during a predetermined time,  
10        producing an average value of the difference values, comparing the average value with a predetermined guard-interval discrimination parameter for the observation guard interval, and discriminating a guard interval mode and an FFT (Fast Fourier Transform) mode according to a result of the  
15        comparison; and

detecting a position in which an accumulated correlation value is maximal from a path of a discriminated guard interval, adding a value of discriminated guard interval length to a value of the detected position to  
20        produce an addition value, and outputting the addition value as information associated with a start point of a useful symbol.

8. The method as set forth in claim 7, further  
25        comprising the step of:

variably setting the counting period according to the discriminated guard interval mode.

9. The method as set forth in claim 7 or 8, wherein the observation guard interval path is a path of a guard interval corresponding to  $1/32$  of the useful data duration.

10. A method for performing an initial symbol synchronization and detection operation so that a guard interval and useful data duration are discriminated from a modulated signal based on OFDM (Orthogonal Frequency Division Multiplexing) and an FFT (Fast Fourier Transform) operation is carried out, said method comprising the steps of:

detecting positions in which accumulated correlation values are maximum during a symbol period from a plurality of guard interval paths and detecting maximum values from the accumulated correlation values;

comparing a ratio of first and second largest values from the detected maximum values with a preset threshold value, discriminating an FFT (Fast Fourier Transform) mode, and determining that a guard interval mode corresponding to a guard interval path that outputs the first largest value is valid; and

detecting a position in which an accumulated correlation value is maximal from a path of a discriminated

guard interval, adding a value of discriminated guard interval length to a value of the detected position to produce an addition value, and outputting the addition value as information associated with a start point of a useful  
5 symbol.